

PRELIMINARY DATA SUMMARY

November 1992

U.S. Army Engineer Waterways Experiment Station
Coastal Engineering Research Center
Field Research Facility
Duck, North Carolina

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CERC Field Research Facility
Duck, North Carolina

This report provides a summary of basic oceanographic, meteorological and bottom profile data for the month. The data were obtained as part of the Measurements and Analysis work units at the U.S. Army Engineer Waterways Experiment Station, Coastal Engineering Research Center's Field Research Facility (FRF) in Duck, North Carolina. The FRF staff collected and analyzed these data. These summaries are intended to make the data readily available to all FRF users, and comments on their content and usefulness are invited.

CONTENTS

	<u>Page</u>
TABLE OF CONTENTS.....	1
PART I: INTRODUCTION.....	2
PART II: METEOROLOGICAL DATA.....	6
PART III: WAVE DATA.....	9
PART IV: CURRENT DATA.....	13
PART V: SUPPLEMENTAL OBSERVATIONS.....	20
PART VI: WATER LEVELS.....	22
PART VII: NEARSHORE PROFILES AND BATHYMETRY.....	25

LIST OF FIGURES

<u>No.</u>		<u>Page</u>
1	FRF location map.....	3
2	Instrument locations at FRF.....	5
3	Time history of wave heights and periods.....	12
4	Water level time history	23
5	CRAB profiles.....	25
6	CRAB profile envelope.....	26
7	FRF bathymetry (26 October 92).....	27

LIST OF TABLES

<u>No.</u>		<u>Page</u>
1	Instrument Status/Data Availability.....	4
2	Meteorological Data.....	7
3	Wave Data.....	10
4	Current Data.....	14
5	Supplemental Observations.....	21
6	Water Levels.....	24

PART I: INTRODUCTION

The U.S. Army Engineer Waterways Experiment Station, Coastal Engineering Research Center's (CERC) Field Research Facility (FRF) is located on the Outer Banks of North Carolina, near the village of Duck (Figure 1).

The FRF research program provides a means for obtaining high-quality field data, particularly during storms, in support of the U.S. Army Corps of Engineers' coastal engineering research missions. The research pier is a reinforced concrete structure supported on 0.9-m-diam steel piles spaced 12.2 m apart along the pier's length and 4.6 m apart across the width. The pier deck is 6.1 m wide and extends from behind the duneline to about the 6-m water depth contour at a height of 7.6 m above the National Geodetic Vertical Datum (NGVD) of the year 1929. In addition, a main building contains offices, an instrument repair shop, and a data acquisition room.

One of the responsibilities of the FRF research program is the collection, analysis and dissemination of data on local oceanographic and meteorological conditions. Bottom profiles along both sides of the pier and periodic bathymetric surveys are also performed.

This summary is intended to provide basic data as soon as possible after they are obtained. Questions and/or comments concerning the data may be directed to Mr. Clifford F. Baron at (919) 261-3511.

Part II presents the meteorological data; Parts III through VI present oceanographic data; Part VII presents nearshore profiles and bathymetry; and Part VIII, if included, documents special events that occurred at the FRF during the month.

Table 1 is a list of instruments used, their operational status during the month, and the data collection status. Figure 2 identifies the location of the instruments. The water depths at the wave gages and current meters vary and may be determined from information contained in Figure 7. Other installation information is contained in Table 1.

Times given in the report, unless otherwise specified, are referenced to eastern standard time (EST).

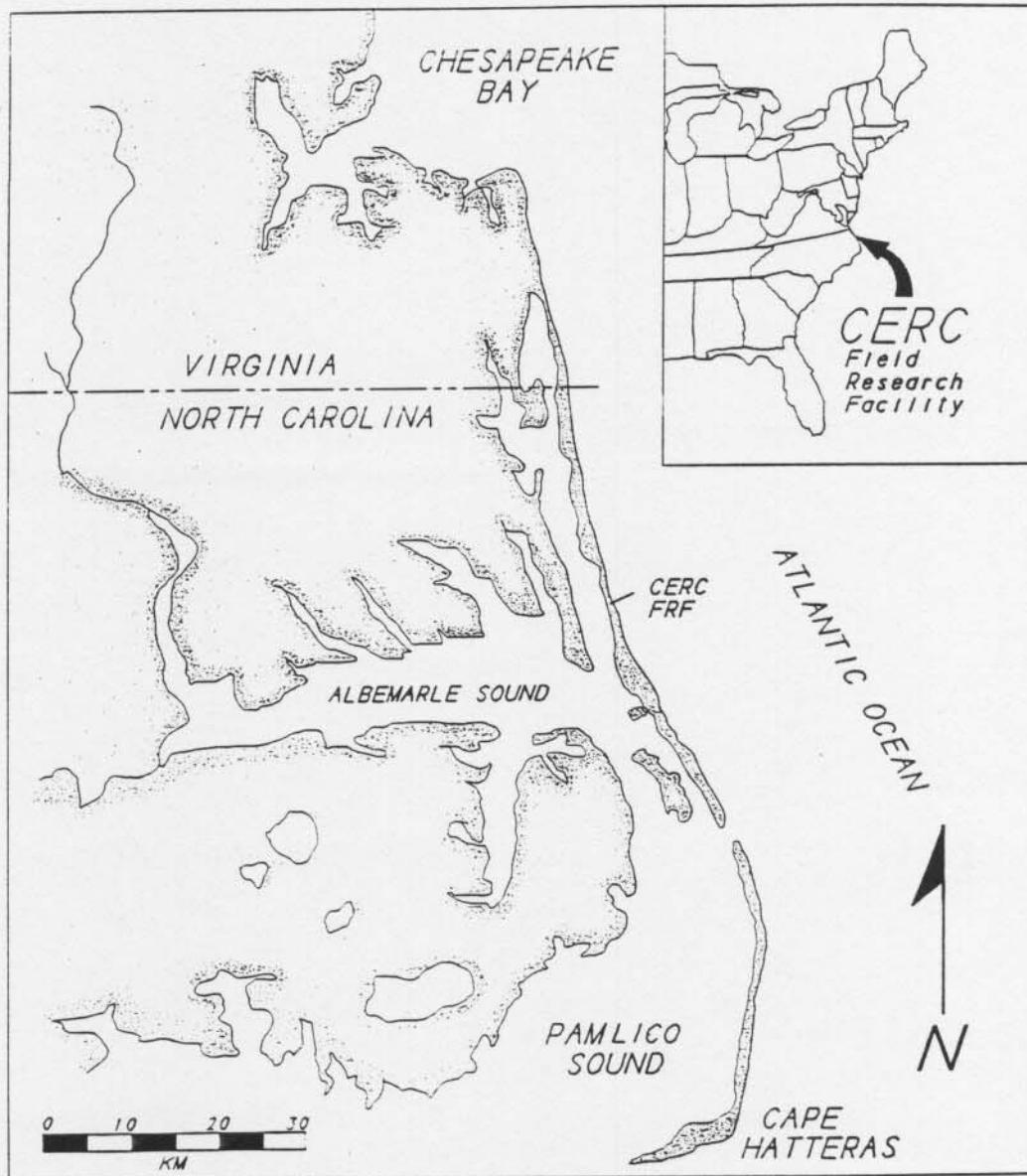


Figure 1. FRF Location Map

Table 1: Instrument Status/Data Availability

NOVEMBER 1992

Gage ID	Description/Remarks	Depth at Sensor		Day of the month																															
				1	2	3	4	5	6	7	8	9	0	1	2	3	4	5	6	7	8	9	0	1	2	3	4	5	6	7	8	9	0		
616	Barometric Pressure		Gage Status	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*		
			Data Collected	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*		
604	Precipitation		Gage Status	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*		
			Data Collected	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*		
624	Air Temperature		Gage Status	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*		
			Data Collected	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*		
932	Anemometer at seaward end of pier Elevation 19 m (NGVD)		Gage Status	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*		
			Data Collected	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	
625	Baylor staff at station 18+60 on FRF pier	see Figure 7	Gage Status	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*		
			Data Collected	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	
111	Pressure gage 309 m north of FRF pier (0.9 km offshore)	Approx. 7.8 m NGVD	Gage Status	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*		
			Data Collected	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	
630	Waverider buoy 4.0 km offshore	Approx. 17 m NGVD	Gage Status	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	
			Data Collected	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	
519	Current meter 320 m north of FRF pier (0.9 km offshore)	see Figure 7	Gage Status	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	
			Data Collected	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
865-1370	NOAA tide station at seaward end of FRF pier		Gage Status	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	
			Data Collected	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
	Supplemental Observations (daily oceanographic and meteorological observations)		Daily observation	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	

Gage Status

Operational = *

Partial = /

Non-Operational = -

Daily Observation

Complete = *

Partial = /

None = -

Data Collected

All = *

Partial = /

None = -

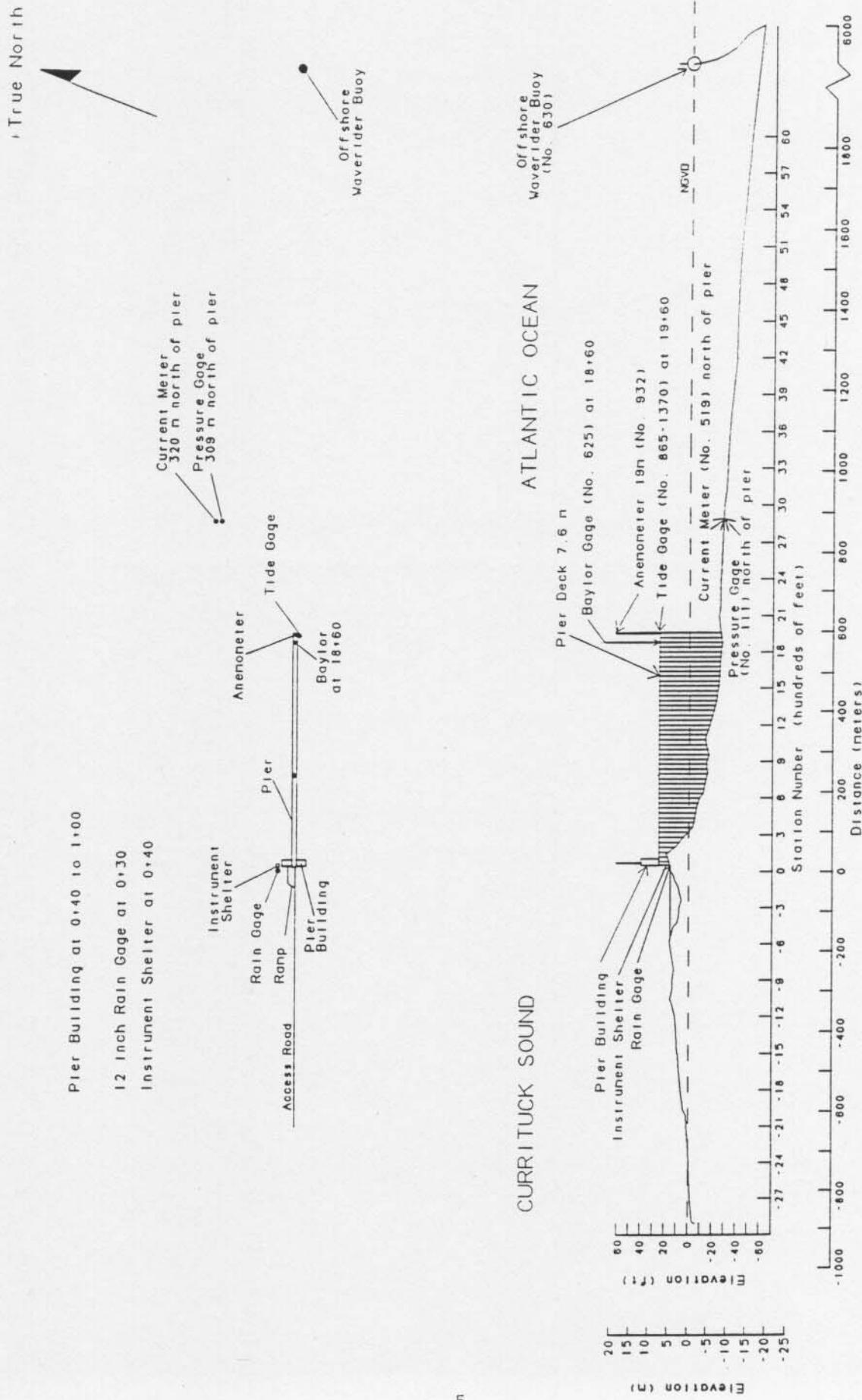


Figure 2. Instrument locations at FRF (all elevations from NGVD, all distances from FRF baseline).

PART II: METEOROLOGICAL DATA

A variety of instruments have been installed at the FRF (Figure 2) to monitor the meteorological conditions. The data presented in Table 2 are collected and stored using a Digital Equipment Corporation VAX 11/750. For each instrument a log is maintained and the records are stored for future reference.

Winds were measured at the end of the pier at an elevation of 19 m (Figure 2) using a WeatherMeasure Skyvane anemometer.

Monthly resultant wind speeds and directions are determined by vector averaging the data. Wind directions indicate where the wind is coming from. Temperature and atmospheric pressure means are the average of the values presented for the month. Total precipitation is the sum for the month.

The following may be useful for converting the data in Table 2 to other frequently used units of measurement:

1. Millimeters (mm) to inches (in.) -
 $mm \times .03937 = in.$
2. Millibars (mb) to inches of mercury (in. Hg) -
 $mb \times 0.02953 = in. Hg$
3. Degrees Celsius (C) to degrees Fahrenheit (F) -
 $(C \times 9/5) + 32 = F$
4. Meters per second (m/s) to knots (kn) -
 $m/s \times 1.943 = kn$

Table 2: Meteorological Data

Nov 1992

Day	Hour	Wind Speed m/sec	Wind Direction deg TN	Temperature deg C	Atm Pressure mb	Precipitation mm
1	100	6	46	14.8	1017.5	0
	700	4	78	14.7	1019.0	0
	1300	3	64	16.2	1018.6	0
	1900	6	70	14.8	1019.9	0
2	100	7	85	15.1	1019.0	0
	700	7	94	16.5	1018.4	0
	1300	6	145	19.0	1016.4	0
	1900	10	139	17.5	1015.5	0
3	100	11	168	20.1	1012.6	0
	700	4	201	20.1	1013.2	35
	1300	7	4	17.9	1015.5	0
	1900	1	38	14.0	1017.2	0
4	100	2	85	15.1	1016.6	0
	700	4	104	16.6	1016.0	0
	1300	4	138	18.2	1012.4	0
	1900	6	181	21.2	1010.6	13
5	100	7	201	21.2	1008.7	0
	700	5	193	21.4	1007.1	18
	1300	6	254	22.4	1004.3	0
	1900	3	233	20.5	1004.7	0
6	100	15	352	12.0	1007.7	0
	700	11	355	10.3	1013.5	0
	1300	8	358	10.5	1015.4	0
	1900	6	351	10.2	1017.7	0
7	100	6	316	9.4	1018.1	0
	700	7	323	9.3	1020.5	0
	1300	8	353	10.6	1019.4	0
	1900	8	7	9.9	1020.6	0
8	100	9	331	8.5	1020.9	0
	700	9	323	7.4	1023.6	0
	1300	9	351	9.5	1025.2	0
	1900	7	355	8.0	1027.1	0
9	100	6	6	8.0	1028.1	0
	700	7	41	8.9	1030.4	0
	1300	8	32	9.8	1030.5	0
	1900	8	37	8.8	1031.8	0
10	100	7	55	9.3	1031.5	0
	700	8	60	10.5	1031.5	0
	1300	6	51	12.5	1030.5	0
	1900	5	67	12.5	1030.0	0
11	100	2	110	13.5	1028.0	0
	700	4	151	14.2	1027.2	0
	1300	7	152	18.6	1024.3	0
	1900	5	188	16.6	1023.0	0
12	100	5	188	14.9	1021.2	0
	700	4	162	16.2	1019.4	0
	1300	9	173	21.9	1014.1	0
	1900	13	178	20.8	1008.9	0
13	100	11	187	23.1	1004.0	11
	700	7	303	17.8	1005.9	0
	1300	9	6	13.5	1010.9	0
	1900	1	67	11.2	1014.6	0
14	100	4	307	9.4	1016.5	0
	700	6	327	8.1	1018.9	0
	1300	4	12	11.8	1018.9	0
	1900	3	276	7.5	1018.5	0
15	100	2	319	6.0	1019.4	0
	700	2	291	5.7	1019.6	0
	1300	6	253	10.7	1019.2	0
	1900	8	329	6.7	1023.1	0
16	100	11	350	5.9	1025.6	0
	700	8	9	7.0	1027.8	0
	1300	7	357	8.0	1027.7	0
	1900	4	1	6.8	1027.3	0

* electronic problems

(Continued)

(Sheet 1 of 2)

Table 2: Meteorological Data

Nov 1992

Day	Hour	Wind	Wind	Temperature	Atm	Precipitation
		Speed m/sec	Direction deg TN	deg C	mb	mm
17	100	3	315	4.7	1025.6	0
	700	2	294	4.3	1025.1	0
	1300	4	226	11.9	1021.7	0
	1900	7	210	11.1	1020.7	0
18	100	6	233	9.8	1020.3	0
	700	4	237	9.5	1021.0	0
	1300	2	33	14.8	1020.0	0
	1900	3	56	12.7	1021.0	0
19	100	3	67	13.1	1021.6	0
	700	5	357	13.4	1023.2	0
	1300	7	354	14.6	1023.5	0
	1900	10	19	13.1	1025.6	0
20	100	12	32	12.3	1026.6	0
	700	10	40	12.5	1028.5	0
	1300	12	42	13.4	1027.9	0
	1900	10	55	13.8	1027.0	0
21	100	7	100	14.6	1026.1	0
	700	7	131	14.5	1024.3	0
	1300	5	141	17.9	1022.0	0
	1900	4	152	14.4	1020.7	0
22	100	4	168	16.8	1018.3	0
	700	3	160	17.4	1017.0	0
	1300	8	187	21.7	1013.4	0
	1900	9	184	19.6	1011.5	0
23	100	10	181	19.5	1007.9	0
	700	8	207	20.1	1007.2	0
	1300	8	256	22.5	1005.7	0
	1900	3	1	17.2	1009.4	0
24	100	6	7	14.4	1013.3	0
	700	7	38	14.2	1015.9	0
	1300	5	17	15.0	1016.4	0
	1900	8	73	15.4	1016.4	0
25	100	1	148	16.0	1014.1	0
	700	3	262	17.5	1016.6	0
	1300	3	1	14.9	1018.9	0
	1900	3	30	15.2	1020.0	9
26	100	7	148	18.6	1017.5	0
	700	7	191	22.4	1015.4	0
	1300	4	205	23.3	1014.5	13
	1900	4	1	22.3	1012.1	12
27	100	3	233	24.4	1012.0	0
	700	9	1	16.1	1012.7	0
	1300	13	31	13.5	1011.2	14
	1900	9	29	13.5	1011.4	13
28	100	9	344	11.6	1012.1	0
	700	7	6	12.3	1013.5	0
	1300	7	334	11.5	1013.4	0
	1900	6	333	9.9	1014.6	0
29	100	5	311	9.6	1013.9	0
	700	7	323	9.1	1014.7	0
	1300	5	340	12.0	1015.4	0
	1900	5	287	8.9	1016.9	0
30	100	5	285	7.2	1017.0	0
	700	3	294	4.3	1017.4	0
	1300	4	250	9.0	1015.5	0
	1900	4	209	9.2	1013.7	0
		Resultant 2	16	Mean 13.7	Mean 1018.3	Total 138

* electronic problems

(Sheet 2 of 2)

PART III: WAVE DATA

Wave data are collected from a Baylor staff gages (Gage 625), a pressure wave gage (Gage 111) and a Waverider buoy (Gage 630) as shown in Table 1 and Figure 2. The data are collected, analyzed, and stored on optical disc using a Digital Equipment Corporation VAX 11/750 programmed to sample the wave gages every 3 hr. The sampling rate is two times per second for five contiguous 34-min records. This report reflects the data collection periods of 0100, 0700, 1300, and 1900 EST. The results are based only on the first 34 minute record.

Wave height H_{mo} is an energy-based statistic equal to four times the standard deviation of the sea surface elevations. Wave height reported from the pressure gage has been compensated for hydrodynamic attenuation using linear wave theory. Wave period is identified from the computation of a variance (energy) spectrum with 60 deg of freedom calculated from a 34-min record. Peak wave period T_p is defined as the period associated with the maximum energy in the spectrum. When this analysis is complete, the data are written to optical disc.

Table 3 presents the wave heights and periods for each wave record obtained at 6 hr intervals during the month. The monthly means and standard deviations from the means shown in Table 3 are average values computed from this data. Figure 3 is a time history of all H_{mo} and T_p values obtained for all gages.

Differences in wave periods between wave gages (Table 3 and Figure 3) may be the result of wave breaking, wave reformation, the presence of multiple wave trains containing nearly equal energy, and statistical variations in spectral estimations.

Table 3: Wave Data

Nov 1992

Day	Hour	625		111		630	
		Baylor at 18+60 Hmo, m	Tp, sec	Pressure Gage Hmo, m	Tp, sec	Offshr Wvrdr Hmo, m	Tp, sec
1	0100	1.43	8.00	1.51	8.53	1.71	6.92
	0700	1.51	8.00	1.64	9.14	1.80	8.26
	1300	1.38	11.13	1.49	11.64	1.57	10.67
	1900	1.33	11.64	1.45	11.64	1.56	11.13
2	0100	1.46	11.64	1.45	11.13	1.60	9.85
	0700	1.34	9.14	1.38	9.14	1.47	10.24
	1300	1.17	8.53	1.33	8.26	1.32	8.26
	1900	1.30	7.31	1.41	5.82	1.63	6.56
3	0100	1.39	6.92	1.56	6.74	1.83	6.74
	0700	1.27	7.53	1.46	7.11	1.60	7.76
	1300	1.24	7.76	1.32	8.26	1.61	8.00
	1900	1.00	7.53	1.13	7.53	1.24	7.11
4	0100	0.92	9.48	0.95	6.92	1.14	9.85
	0700	1.00	11.13	1.08	11.13	1.21	11.13
	1300	1.01	11.13	1.10	11.13	1.20	11.13
	1900	1.03	12.19	1.06	12.19	1.13	12.19
5	0100	1.08	12.80	1.14	13.47	1.13	12.80
	0700	0.94	13.47	1.00	13.47	1.11	12.19
	1300	0.83	13.47	0.94	13.47	0.97	12.19
	1900	0.83	14.22	0.85	14.22	0.95	12.80
6	0100	1.41	5.22	1.51	5.02	1.72	5.22
	0700	1.52	6.56	1.64	5.57	1.92	6.56
	1300	1.43	6.56	1.51	6.56	1.66	6.74
	1900	0.95	13.47	1.02	14.22	1.23	6.24
7	0100	0.79	5.95	0.87	14.22	1.02	6.09
	0700	0.76	13.47	0.80	15.06	1.06	13.47
	1300	0.73	15.06	0.74	14.22	0.88	14.22
	1900	0.77	15.06	0.83	15.06	1.04	4.49
8	0100	0.76	14.22	0.75	4.27	0.98	4.27
	0700	0.94	5.22	1.01	5.57	1.47	5.82
	1300	1.20	6.09	1.23	6.40	1.60	5.82
	1900	1.15	6.74	1.10	6.92	1.32	6.74
9	0100	1.12	7.31	1.11	7.53	1.38	7.76
	0700	1.09	8.00	1.12	8.83	1.29	7.11
	1300	1.25	8.00	1.25	8.83	1.50	8.53
	1900	1.17	7.11	1.24	8.83	1.39	9.14
10	0100	1.24	9.48	1.22	9.85	1.34	9.85
	0700	1.20	7.53	1.26	8.83	1.35	8.53
	1300	1.30	12.19	1.42	11.13	1.43	9.48
	1900	1.19	11.13	1.23	11.13	1.36	11.13
11	0100	1.10	10.67	1.19	11.13	1.28	11.13
	0700	0.94	11.64	1.11	11.64	1.16	10.24
	1300	0.89	11.13	0.91	11.13	1.02	11.13
	1900	0.86	11.64	1.01	11.13	0.99	11.13
12	0100	0.70	10.24	0.78	11.13	0.82	11.13
	0700	0.70	9.85	0.77	10.24	0.81	9.85
	1300	0.69	9.85	0.68	9.14	0.78	9.85
	1900	0.98	9.48	1.09	10.24	1.31	5.33
13	0100	0.98	9.85	1.07	10.24	1.24	7.76
	0700	0.91	10.67	0.99	8.83	1.12	9.48
	1300	1.32	5.33	1.41	5.45	1.58	5.69
	1900	1.21	9.85	1.19	10.67	1.33	9.85
14	0100	0.84	10.24	0.85	9.85	0.99	9.48
	0700	0.80	9.85	0.82	9.14	1.01	9.48
	1300	0.74	9.85	0.83	9.85	0.99	8.53
	1900	0.78	5.57	0.84	10.24	1.01	9.85
15	0100	0.63	9.85	0.70	10.24	0.78	9.48
	0700	0.54	9.48	0.57	9.85	0.66	9.85
	1300	0.45	9.48	0.47	9.85	0.57	9.48
	1900	0.66	9.14	0.65	9.14	1.16	4.34
16	0100	1.04	5.12	1.14	5.12	1.70	5.02
	0700	1.09	5.82	1.17	5.95	1.44	5.45
	1300	0.88	5.95	0.90	5.82	1.13	6.09
	1900	0.68	5.82	0.67	5.57	0.81	5.95

* Electronic problems

(Continued)

(Sheet 1 of 2)

Table 3: Wave Data

Nov 1992

Day	Hour	625		111		630	
		Baylor	at 18+60	Pressure Gage		Offshhr	Wvrdrt
17	0100	0.56	8.83	0.58	8.26	0.64	5.57
	0700	0.51	8.83	0.49	8.53	0.57	8.26
	1300	0.44	9.14	0.49	8.83	0.52	8.53
	1900	0.37	8.83	0.42	8.83	0.46	9.14
18	0100	0.31	9.14	0.34	8.83	0.42	8.83
	0700	0.28	9.14	0.33	8.26	0.38	8.53
	1300	0.29	8.83	0.34	8.53	0.35	8.00
	1900	0.36	8.53	0.39	8.53	0.46	8.83
19	0100	0.41	8.26	0.42	9.14	0.53	8.83
	0700	0.51	8.83	0.44	8.83	0.57	8.53
	1300	0.79	4.06	0.77	4.20	0.88	4.00
	1900	1.32	6.24	1.35	6.40	1.54	5.95
20	0100	1.71	6.09	1.78	6.56	2.16	6.40
	0700	1.82	6.92	1.92	6.74	2.27	6.92
	1300	1.97	6.74	2.30	6.74	2.34	6.92
	1900	1.73	7.11	1.96	7.11	2.05	7.11
21	0100	1.59	7.76	1.64	7.11	1.94	7.53
	0700	1.51	8.53	1.67	9.85	1.86	8.83
	1300	1.42	9.48	1.52	9.85	1.54	9.85
	1900	1.33	9.14	1.32	8.53	1.56	8.00
22	0100	1.18	8.26	1.23	9.14	1.47	8.83
	0700	1.01	9.14	1.10	8.26	1.32	8.83
	1300	0.96	9.48	1.06	8.00	1.23	7.31
	1900	0.91	8.26	0.97	8.26	1.12	9.14
23	0100	0.85	9.14	0.91	7.53	1.11	7.76
	0700	0.81	9.14	0.88	9.14	1.15	7.76
	1300	0.75	9.14	0.87	8.53	1.00	8.83
	1900	0.78	9.14	0.85	9.14	1.03	9.14
24	0100	0.66	8.53	0.64	8.53	0.81	8.53
	0700	0.94	4.27	0.89	4.06	1.11	8.83
	1300	0.87	4.49	0.88	8.83	0.99	8.83
	1900	1.10	4.66	1.10	4.57	1.21	4.49
25	0100	1.07	5.45	1.07	5.57	1.15	5.33
	0700	1.05	5.95	1.01	6.56	1.25	6.74
	1300	0.85	6.40	0.93	7.31	1.12	5.69
	1900	1.08	11.13	1.20	11.13	1.19	10.24
26	0100	1.18	12.80	1.18	12.80	1.36	12.19
	0700	1.16	12.19	1.27	11.64	1.38	11.64
	1300	0.98	11.64	1.02	11.64	1.29	11.13
	1900	0.95	11.13	1.07	11.13	1.18	10.67
27	0100	0.85	10.67	0.95	7.76	1.11	7.31
	0700	0.86	8.26	0.90	10.67	1.06	7.76
	1300	1.83	5.95	1.82	5.69	2.15	5.82
	1900	1.55	6.40	1.75	6.24	1.90	6.24
28	0100	1.37	6.40	1.51	6.24	1.68	6.09
	0700	1.18	5.69	1.22	6.40	1.44	6.40
	1300	0.96	5.82	1.01	6.09	1.26	8.00
	1900	0.95	8.83	0.99	8.83	1.11	9.14
29	0100	0.77	8.26	0.81	8.00	0.93	8.53
	0700	0.94	8.83	0.96	5.82	1.08	6.40
	1300	0.77	9.14	0.78	9.14	0.86	9.48
	1900	0.69	8.53	0.69	8.00	0.80	8.26
30	0100	0.55	7.31	0.62	8.83	0.68	8.53
	0700	0.54	9.48	0.52	9.85	0.55	9.85
	1300	0.42	9.48	0.42	9.85	0.48	9.85
	1900	0.41	5.02	0.42	9.14	0.48	9.85
Mean		0.99	8.82	1.05	8.90	1.20	8.44
Std dev		0.35	2.45	0.38	2.44	0.42	2.14

* Electronic problems

(Sheet 2 of 2)

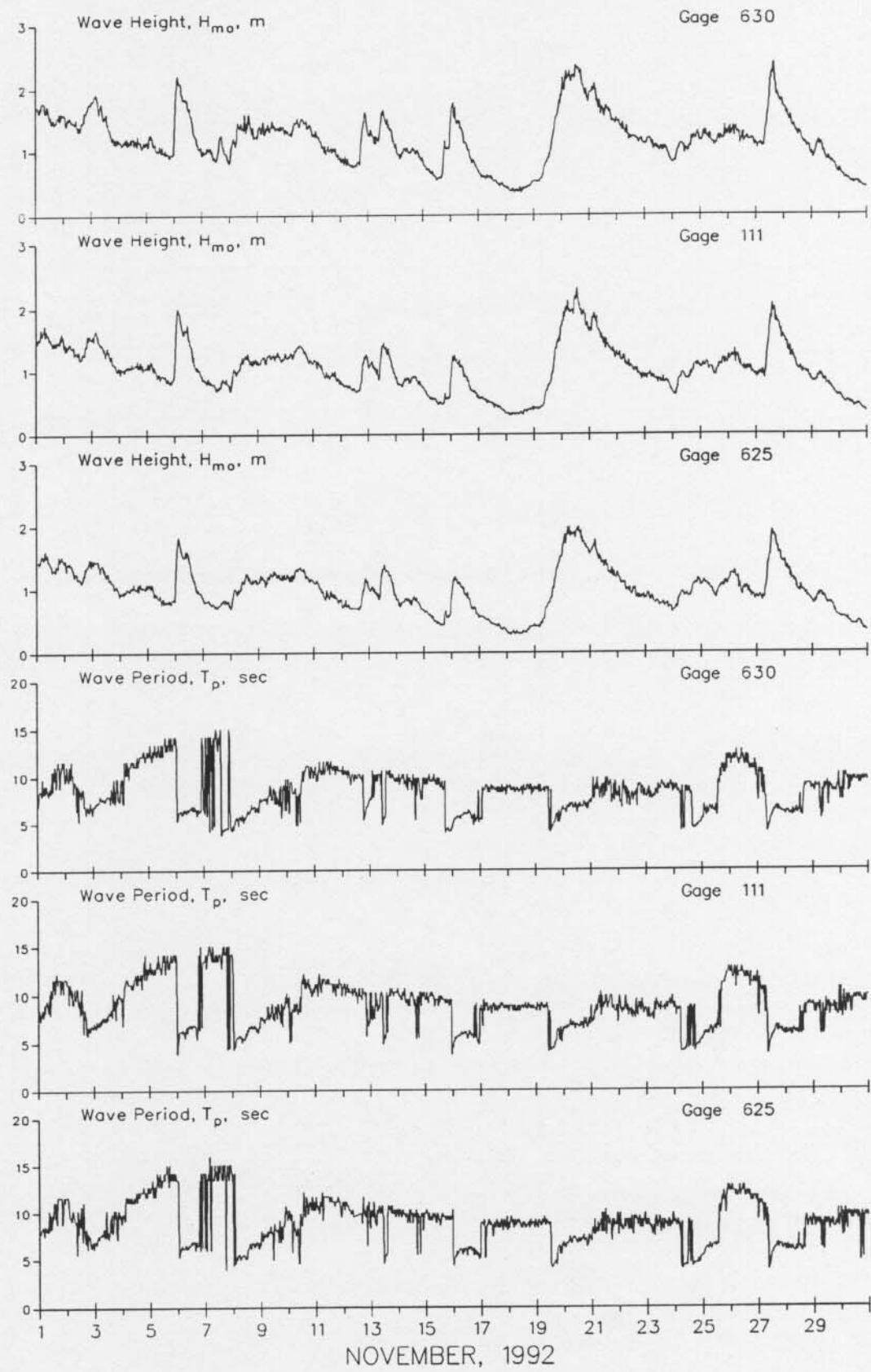


Figure 3. Time history of wave heights and periods

PART IV: CURRENT DATA

Current data (Table 4) are collected from a Marsh-McBirney electromagnetic biaxial current meter (Table 1 and Figure 2) and by visually observing the movement of dye on the water surface in the surf and at the seaward end of the pier, as well as 500 m updrift of the pier 12 m offshore.

Since the shoreline orientation is approximately N20W, longshore currents flow either toward 340 deg (i.e. northward) or toward 160 deg (i.e. southward). Similarly, cross-shore currents are either onshore (westward) or offshore (eastward).

All current speeds are given in centimeters per second (cm/sec). Resultant speeds and directions are determined by vector averaging the cross-shore and longshore data. Current directions indicate the direction that the current is moving towards.

IMPORTANT NOTE

Direction resultants regarding the current meter data (gages 519 and 529) may be in error by minus 5 degrees due to a faulty compass reading. Please call us if you must use this data.

Table 4: Current Data
Nov 1992

Day	Alongshore Cross-shore Resultant Time	Pier Measurements				Beach Measurements			Current Meter	
		Dye at (579 m) (surface)	Distance from Baseline (m)	Dye at Mid-Surf Zone (surface)	(500m Updrift)	Dye 12m offshore (surface)	Location	Speed	Dir	0.9 km Offshore Depth -5.6m (NGVD) ID #519
1 0100-Along Cross Result								45	S	
1 0700-Along Cross Result		7 3 8	S off 138	152	23 6 24	S off 146	North	11	N	14 29
1 1300-Along Cross Result								18	S	
1 1900-Along Cross Result								6	off	
1 1900-Along Cross Result								19	141	
2 0100-Along Cross Result								27	S	
2 0700-Along Cross Result		12 0 12	N off 340	238	17 16 23	N off 22	South	76	N	11 29
2 1300-Along Cross Result								29	138	
2 1900-Along Cross Result								14	S	
3 0100-Along Cross Result								5	off	
3 0700-Along Cross Result		17 7 18	N off 2	140	76 0 76	N off 340	South	42	N	14 8 9
3 1300-Along Cross Result								11	296	
3 1900-Along Cross Result								7	N	
3 1900-Along Cross Result								3	off	
3 1900-Along Cross Result								8	5	
4 0100-Along Cross Result								9	S	
4 0700-Along Cross Result		17 2 17	N on 334	152	87 0 87	N off 340	South	18	N	12 11 13
4 1300-Along Cross Result								2	N	
4 1900-Along Cross Result								0	off	
4 1900-Along Cross Result								2	340	
5 0100-Along Cross Result								5	N	
5 0700-Along Cross Result		51 0 51	N off 340	165	34 17 38	N off 7	South	9	N	1
5 1300-Along Cross Result								13	N	
5 1900-Along Cross Result								5	on	
								14	321	
								12	N	
								9	on	
								15	302	
								2	N	
								1	off	
								3	14	

KEY = All speeds in cm/sec
N = Northward, Shore parallel
S = Southward, Shore parallel
on = onshore off = offshore

Table 4: Current Data (Continued)
Nov 1992

Alongshore Cross-shore Resultant Time Day	Pier Measurements						Beach Measurements			Current Meter	
	Dye at (579 m) (surface)	Speed	Dir	Dye at Mid-Surf Zone (surface)	Distance from Baseline (m)	Speed	Dir	Dye 12m offshore (surface)	Location	Speed	Dir
6 0100-Along Cross Result										23	S
6 0700-Along Cross Result	68 17 70	S on 174		102 0 102	S 177 160			21	S	9 24	off 137
6 1300-Along Cross Result								North		47 16 50	S off 141
6 1900-Along Cross Result										34 13 36	S off 140
7 0100-Along Cross Result										29 11 31	S off 140
7 0700-Along Cross Result	51 13 52	S on 174		55 0 55	S 152 160			8	S	17 47 20	S off 132
7 1300-Along Cross Result								North		31 12 34	S off 139
7 1900-Along Cross Result										35 14 37	S off 139
8 0100-Along Cross Result										31 1 19	S off 157
8 0700-Along Cross Result	68 0 68	S 152 160		76 8 77	S on 166			33	S	35 11 37	S off 143
8 1300-Along Cross Result								North		30 10 31	S off 142
8 1900-Along Cross Result										38 11 40	S off 144
9 0100-Along Cross Result										24 9 26	S off 139
9 0700-Along Cross Result	36 18 40	S on 187		76 19 79	S on 174			35	S	22 10 24	S off 135
9 1300-Along Cross Result								North		21 7 22	S off 141
9 1900-Along Cross Result										32 15 35	S off 135
10 0100-Along Cross Result										24 5 24	S off 149
10 0700-Along Cross Result	11 3 11	S on 174		41 10 42	S on 174			6	N	12 6 14	S off 134
10 1300-Along Cross Result								North		8 6 10	S off 123
10 1900-Along Cross Result										14 5 15	S off 139

KEY = All speeds in cm/sec

N = Northward, Shore parallel

S = Southward, Shore parallel

on = onshore off = offshore

Table 4: Current Data (Continued)
Nov 1992

Alongshore Cross-shore Resultant Time Day	Pier Measurements						Beach Measurements			Current Meter	
	Dye at (579 m) (surface)	Distance from Baseline (m)	Dye at Mid-Surf Zone (surface)		(500m Updrift)			Dye 12m offshore (surface)	Location	Speed	Dir
	Speed	Dir			Speed	Dir					
11 0100-Along Cross Result										11	S
										4	off
										12	142
11 0700-Along Cross Result	13 2 13	N on 331	140	21 0 21	N 340		38	N		4	S
										4	off
										6	113
11 1300-Along Cross Result										9	S
										4	off
										10	137
11 1900-Along Cross Result										17	N
										6	on
										18	321
12 0100-Along Cross Result										16	N
										4	on
										16	325
12 0700-Along Cross Result	61 0 61	N 0 340	140	41 0 41	N 340		5	S		17	N
										3	on
										17	329
12 1300-Along Cross Result										9	N
										2	on
										9	325
12 1900-Along Cross Result										29	N
										5	on
										29	331
13 0100-Along Cross Result										36	N
										6	on
										36	331
13 0700-Along Cross Result	28 7 29	S on 174	165	22 5 22	N on 326		25	N		23	N
										9	on
										24	318
13 1300-Along Cross Result										16	S
										10	off
										18	129
13 1900-Along Cross Result										8	S
										5	off
										9	130
14 0100-Along Cross Result										7	S
										6	off
										9	120
14 0700-Along Cross Result	15 0 15	S 0 160	140	44 0 44	S 0 160		9	S		0	
										1	off
										1	70
14 1300-Along Cross Result										15	S
										12	off
										19	120
14 1900-Along Cross Result										3	N
										1	off
										4	2
15 0100-Along Cross Result										4	S
										4	off
										6	112
15 0700-Along Cross Result	7 3 8	S off 138	140	18 4 18	S off 146		32	N		2	S
										3	off
										4	103
15 1300-Along Cross Result										11	S
										6	off
										12	133
15 1900-Along Cross Result										33	S
										11	off
										35	141

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N = Northward, Shore parallel
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on = onshore off = offshore

Table 4: Current Data (Continued)
Nov 1992

Alongshore Cross-shore Resultant Time Day	Pier Measurements				Beach Measurements				Current Meter	
	Dye at (579 m) (surface)	Distance from Baseline (m)	Dye at Mid-Surf Zone (surface)	(500m Updrift)	Dye 12m offshore (surface)	Location	Speed	Dir	Speed	Dir
16 0100-Along Cross Result									35	S
									13	off
									38	140
16 0700-Along Cross Result	38 10 39	S on 174	152	68 0 68	S 160	North	43	S	23	S
									10	off
									25	137
16 1300-Along Cross Result									22	S
									9	off
									24	138
16 1900-Along Cross Result									18	S
									5	off
									19	144
17 0100-Along Cross Result									24	S
									11	off
									26	135
17 0700-Along Cross Result	3 1 3	S off 133	140	9 1 9	S on 169	North	20	N	12	S
									6	off
									13	132
17 1300-Along Cross Result									4	S
									3	off
									5	119
17 1900-Along Cross Result									18	N
									4	off
									18	352
18 0100-Along Cross Result									8	N
									6	on
									10	306
18 0700-Along Cross Result	16 14 22	N off 22	140	20 5 21	N off 354	South	12	N	7	N
									3	on
									8	318
18 1300-Along Cross Result									3	N
									3	off
									4	22
18 1900-Along Cross Result									1	S
									5	off
									5	86
19 0100-Along Cross Result									12	S
									0	
									12	160
19 0700-Along Cross Result	11 3 12	S on 174	152	51 0 51	S 160	North	13	N	10	S
									7	off
									12	125
19 1300-Along Cross Result									5	S
									8	off
									10	101
19 1900-Along Cross Result									35	S
									17	off
									39	135
20 0100-Along Cross Result									31	S
									12	off
									33	139
20 0700-Along Cross Result	47 26 54	S on 189	165	87 65 109	S on 197	North	36	S	39	S
									19	off
									43	135
20 1300-Along Cross Result									34	S
									13	off
									36	139
20 1900-Along Cross Result									48	S
									19	off
									52	139

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 S = Southward, Shore parallel
 on = onshore off = offshore

Table 4: Current Data (Continued)
Nov 1992

Alongshore Cross-shore Resultant ---- Time	Pier Measurements				Beach Measurements (500m Updrift)				Current Meter	
	Dye at (579 m) (surface)	Dye at Mid-Surf Zone (surface)	Distance from Baseline (m)	Speed	Dir	Dye 12m offshore (surface)	Location	Speed	Dir	0.9 km Offshore Depth -5.6m (NGVD) ID #519
Day	Speed	Dir								
21 0100-Along Cross Result										
	14	N		87	N			23	S	
	0		140	0				6	off	
	14	340		87	340	South	22	24	145	
21 0700-Along Cross Result										
	5									
21 1300-Along Cross Result										
	1									
21 1900-Along Cross Result										
	5									
22 0100-Along Cross Result										
	3									
22 0700-Along Cross Result										
	1									
22 1300-Along Cross Result										
	12									
22 1900-Along Cross Result										
	1									
23 0100-Along Cross Result										
	16									
23 0700-Along Cross Result										
	1									
23 1300-Along Cross Result										
	16									
23 1900-Along Cross Result										
	7									
24 0100-Along Cross Result										
	17									
24 0700-Along Cross Result										
	9									
24 1300-Along Cross Result										
	4									
24 1900-Along Cross Result										
	9									
25 0100-Along Cross Result										
	10									
25 0700-Along Cross Result										
	25									
25 1300-Along Cross Result										
	18									
25 1900-Along Cross Result										
	9									
	20									
	21									
	9									
	23									
	136									
	24									
	10									
	26									
	138									
	21									
	8									
	23									
	139									
	31									
	11									
	33									
	141									
	30									
	15									
	33									
	133									

KEY = All speeds in cm/sec

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Table 4: Current Data (Concluded)
Nov 1992

Alongshore Cross-shore Resultant Time Day	Pier Measurements						Beach Measurements (500m Updrift)			Current Meter	
	Dye at (579 m) (surface)	Speed	Dir	Dye at Mid-Surf Zone (surface)	Distance from Baseline (m)	Speed	Dir	Dye 12m offshore (surface)	Location	Speed	Dir
26 0100-Along Cross Result										16	S
26 0700-Along Cross Result	15 11 19	N off 17		140	76 11 77	N off 349		29	N	14	off
26 1300-Along Cross Result										21	119
26 1900-Along Cross Result										7	S
27 0100-Along Cross Result										4	on
27 0700-Along Cross Result	36 11 37	S on 177		152	47 0 47	S off 160		107	S	8	191
27 1300-Along Cross Result										5	S
27 1900-Along Cross Result										3	off
28 0100-Along Cross Result										6	134
28 0700-Along Cross Result	47 0 47	S off 160		152	61 15 63	S on 174		7	N	3	90
28 1300-Along Cross Result										1	S
28 1900-Along Cross Result										3	off
29 0100-Along Cross Result										3	9
29 0700-Along Cross Result	34 0 34	S off 160		140	51 0 51	S off 160		42	S	1	on
29 1300-Along Cross Result										9	9
29 1900-Along Cross Result										16	168
30 0100-Along Cross Result										21	1
30 0700-Along Cross Result	13 6 14	S off 133		140	9 7 11	S off 123		0		1	off
30 1300-Along Cross Result										19	119
30 1900-Along Cross Result										20	144

KEY = All speeds in cm/sec

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S = Southward, Shore parallel

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PART V: SUPPLEMENTAL OBSERVATIONS

Visual wave direction measurements (Table 5) of both the primary wave train (i.e. that having the larger wave heights) and the secondary wave train (which must be clearly distinguishable as a wave train separate from the primary waves but not surface chop or capillary waves) are taken daily at the seaward end of the pier. The direction of the primary wave train just north of the seaward end of the pier is also determined using a Raytheon Marine Pathfinder radar and measuring the alignment of the wave crests at approximately the same location as the visual measurements. The pier axis (considered perpendicular to the beach at the FRF) is oriented 70 deg east of true north; consequently, wave angles greater than 70 deg indicate that the waves were coming from the south side of the pier.

The width of the surf zone (seawardmost breaker position to shoreline) is determined from the pier deck.

Measurements of surface water temperature, density, and visibility are also taken daily at the seaward end of the pier. A Bucket Thermometer is lowered about 0.3 m into the water and allowed to remain for at least one minute. The temperature is then read, and a hydrometer is used to determine the density. A Secchi disc is used to determine the depth of visibility.

Table 5: Supplemental Observations

Nov 1992

Day	Time	Wave Approach		Radar Wave Angle deg from True N	Width of Surf Zone,m	Water Characteristics at Pier End		
		Primary	Secondary			Temp., C	Density g/cc	Secchi Vis., m
1	1100	60			148	16.1	1.0222	1.8
2	0900	30	115	45	138	16.1	1.0221	0.9
3	0906	80	355		162	16.7	1.0229	0.9
4	0900	90			101	16.7	1.0229	1.5
5	0830	90	140		122	17.2	1.0230	1.2
6	0825	30		30	185	16.1	1.0234	1.2
7	1038	15			96	15.0	1.0226	1.2
8	1000	25		40	136	14.4	1.0214	0.9
9	0830	40		80	137	13.3	1.0211	1.2
10	0842	50		60	136	13.3	1.0216	1.8
11	0915	75	65		94	14.4	1.0226	1.2
12	0910	75			85	15.0	1.0231	1.8
13	0920	135			110	15.6	1.0238	1.5
14	1015	20		50	71	15.0	1.0240	0.9
15	0940	35			43	14.4	1.0240	0.9
16	0830	35		45	119	12.5	1.0229	1.2
17	0830	80	25		48	12.2	1.0226	1.8
18	0830	90			61	12.8	1.0230	1.8
19	0830	30			67	13.3	1.0232	2.4
20	0835	40		50	400	13.3	1.0230	0.9
21	0930	80		75	223	14.4	1.0224	0.6
22	0921	80			122	13.1	1.0227	1.2
23	0854	90			94	14.4	1.0234	0.6
24	0920	45		40	102	14.4	1.0240	1.2
25	0840	85	20		114	14.4	1.0237	1.2
26	0901	75	120		85	14.4	1.0229	0.9
27	0840	25		90	101	14.4	1.0237	1.2
28	1030	30	5		93	13.9	1.0234	1.2
29	0950	20		35	100	13.3	1.0227	1.2
30	0825	40			25	13.0	1.0217	1.8

PART VI: WATER LEVELS

Since 1978, the National Oceanic and Atmospheric Administration (NOAA)/National Ocean Service (NOS) has operated a primary tide station (No. 865-1370) at the seaward end of the FRF pier. A Leupold-Stevens digital recording float-type tide gage is used to collect instantaneous water level data every 6 minutes throughout the month.

The variation in water level during the month is shown in Figure 4 along with a list of mean and extreme values. This presentation is useful in identifying effects of both meteorological and astronomical forces on the open coast water level.

Table 6 contains the time at the center of each 12.42-hr tidal cycle and the range, high, low, and mean water levels during each tidal cycle.

FRF Tide Heights

Nov 1992

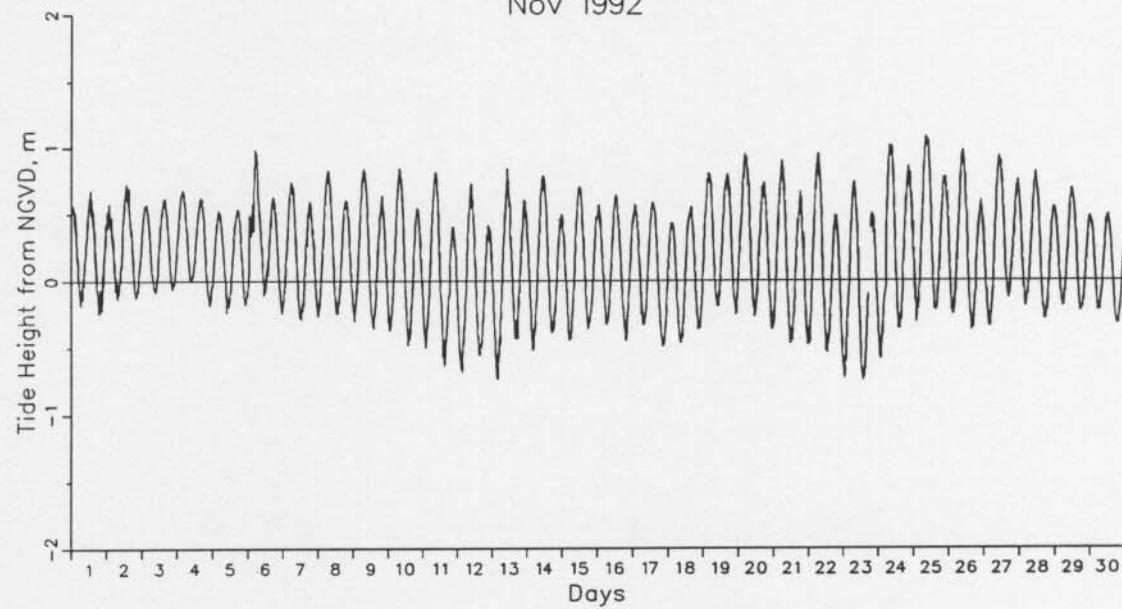


Figure 4. Water level time history

Monthly Water Levels,m NGVD

Extreme Low = -0.74 on day 13 at 224 EST
Extreme High = 1.08 on day 25 at 706 EST
Monthly Mean = 0.18
Mean Low = -0.34
Mean High = 0.77
Mean Range = 1.11

Table 6: Water Levels,m NGVD

		Nov 1992			
Mid-Cycle Day	Time	Low	High	Mean	Range
1	748	-0.18	0.68	0.24	0.86
1	2013	-0.24	0.62	0.18	0.86
2	838	-0.13	0.73	0.26	0.86
2	2103	-0.12	0.70	0.25	0.83
3	928	-0.09	0.61	0.26	0.70
3	2154	-0.06	0.67	0.29	0.74
4	1019	0.00	0.68	0.32	0.68
4	2244	-0.19	0.62	0.20	0.81
5	1109	-0.24	0.54	0.17	0.78
5	2334	-0.18	0.99	0.27	1.16
6	1200	-0.11	0.96	0.35	1.06
7	25	-0.25	0.74	0.23	0.98
7	1250	-0.29	0.70	0.17	0.99
8	115	-0.27	0.82	0.24	1.09
8	1340	-0.25	0.83	0.24	1.08
9	206	-0.30	0.84	0.25	1.14
9	1431	-0.36	0.80	0.19	1.16
10	256	-0.37	0.84	0.20	1.22
10	1521	-0.48	0.78	0.12	1.26
11	346	-0.50	0.81	0.14	1.31
11	1612	-0.64	0.68	-0.01	1.32
12	437	-0.69	0.73	-0.03	1.42
12	1702	-0.56	0.60	-0.03	1.16
13	527	-0.74	0.84	-0.03	1.58
13	1752	-0.44	0.70	0.13	1.13
14	618	-0.52	0.79	0.13	1.31
14	1843	-0.39	0.71	0.10	1.10
15	708	-0.45	0.71	0.11	1.16
15	1933	-0.37	0.61	0.11	0.98
16	758	-0.33	0.64	0.16	0.97
16	2023	-0.45	0.57	0.09	1.02
17	849	-0.34	0.59	0.14	0.92
17	2114	-0.49	0.54	-0.01	1.04
18	939	-0.47	0.55	0.02	1.01
18	2204	-0.37	0.80	0.16	1.17
19	1029	-0.20	0.80	0.31	1.00
19	2255	-0.26	0.95	0.33	1.21
20	1120	-0.27	0.93	0.30	1.20
20	2345	-0.37	0.86	0.21	1.23
21	1210	-0.48	0.90	0.13	1.38
22	35	-0.48	0.95	0.16	1.43
22	1301	-0.54	0.94	0.10	1.48
23	126	-0.73	0.74	-0.03	1.47
23	1351				
24	216	-0.59	1.01	0.09	1.60
24	1441	-0.37	1.01	0.30	1.38
25	307	-0.31	1.08	0.38	1.39
25	1532	-0.23	1.06	0.36	1.28
26	357	-0.26	0.98	0.32	1.23
26	1622	-0.37	0.94	0.21	1.32
27	447	-0.34	0.94	0.21	1.28
27	1713	-0.13	0.91	0.36	1.04
28	538	-0.19	0.82	0.30	1.01
28	1803	-0.29	0.74	0.17	1.03
29	628	-0.20	0.69	0.23	0.89
29	1853	-0.23	0.64	0.16	0.87
30	719	-0.23	0.50	0.15	0.73
30	1944	-0.33	0.44	0.02	0.77

PART VII: NEARSHORE PROFILES

* A. Nearshore Profiles. In order to document profile response away from the pier, surveys of four profile lines extending 900 to 1,000 m from shore and located 489 and 581 m north and 517 and 608 m south of the FRF pier are conducted bi-weekly, after storms, and during more complete bathymetric surveys.

These profiles are obtained using the CRAB-Geodimeter surveying system; a Geodimeter 140-T self-tracking, electronic theodolite, distance meter, in combination with the Coastal Research Amphibious Buggy (CRAB), a 10.7 m high, self-powered, mobile tripod on wheels.

During November the CRAB was being overhauled and fitted with a new engine, thus was unavailable for surveying. Figures 5 and 6 are the October surveys and are included for reference.

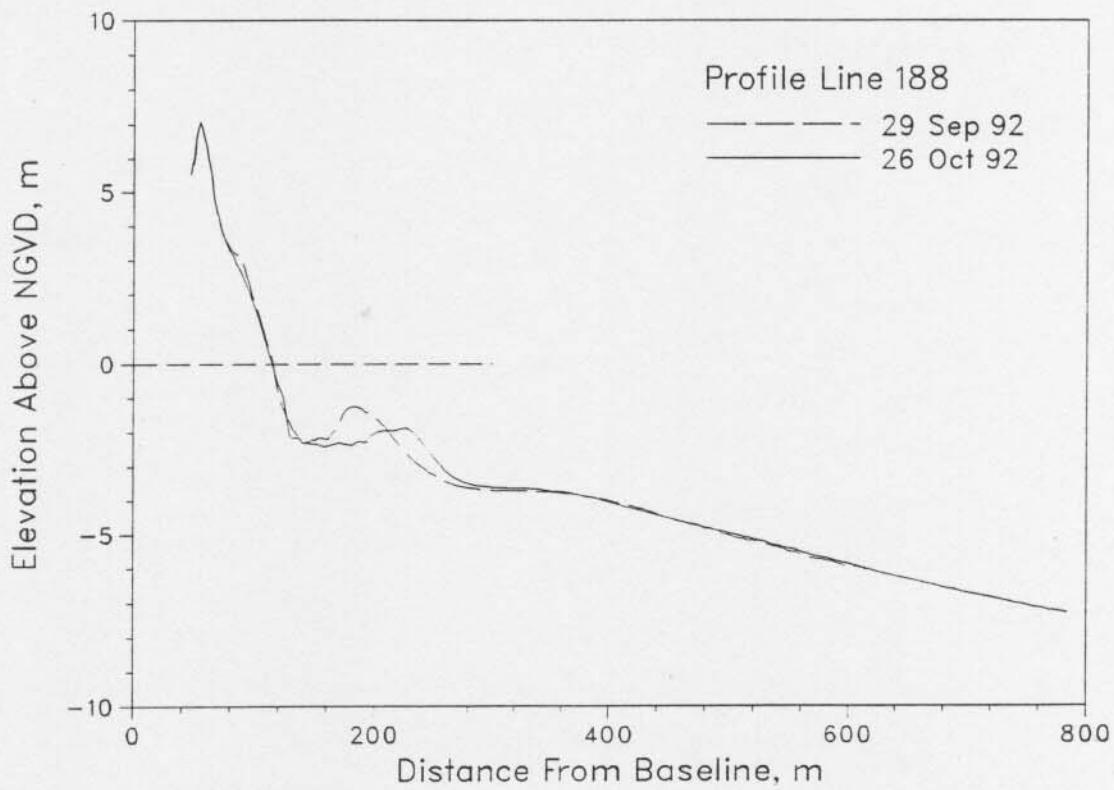


Figure 5. Monthly CRAB profiles on profile 188 - 517 m south of pier.

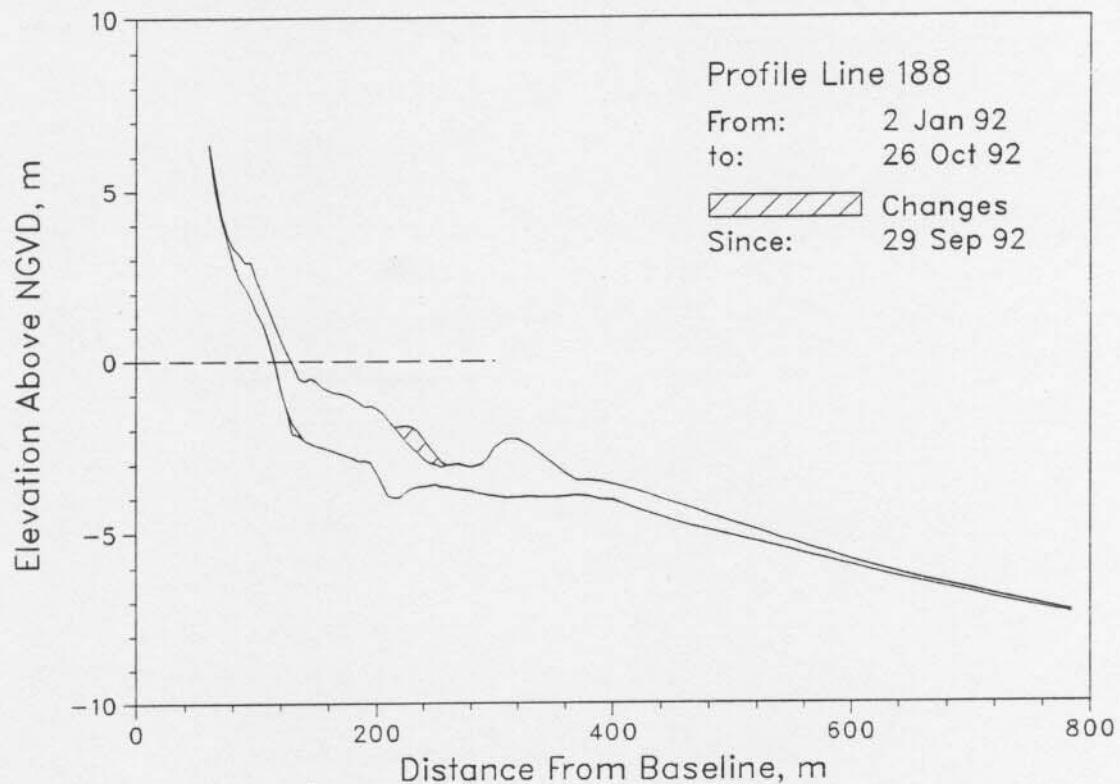


Figure 6. CRAB profile envelope - profile 188.

B. Bathymetry. Figure 7 includes a two- and three-dimensional contour map and a change plot derived from the bathymetric survey on 26 October. Wide contour lines on the change diagram represent eroded areas; thin lines indicate deposition.

Figure 7 is included for reference. There was no survey during the month of November.

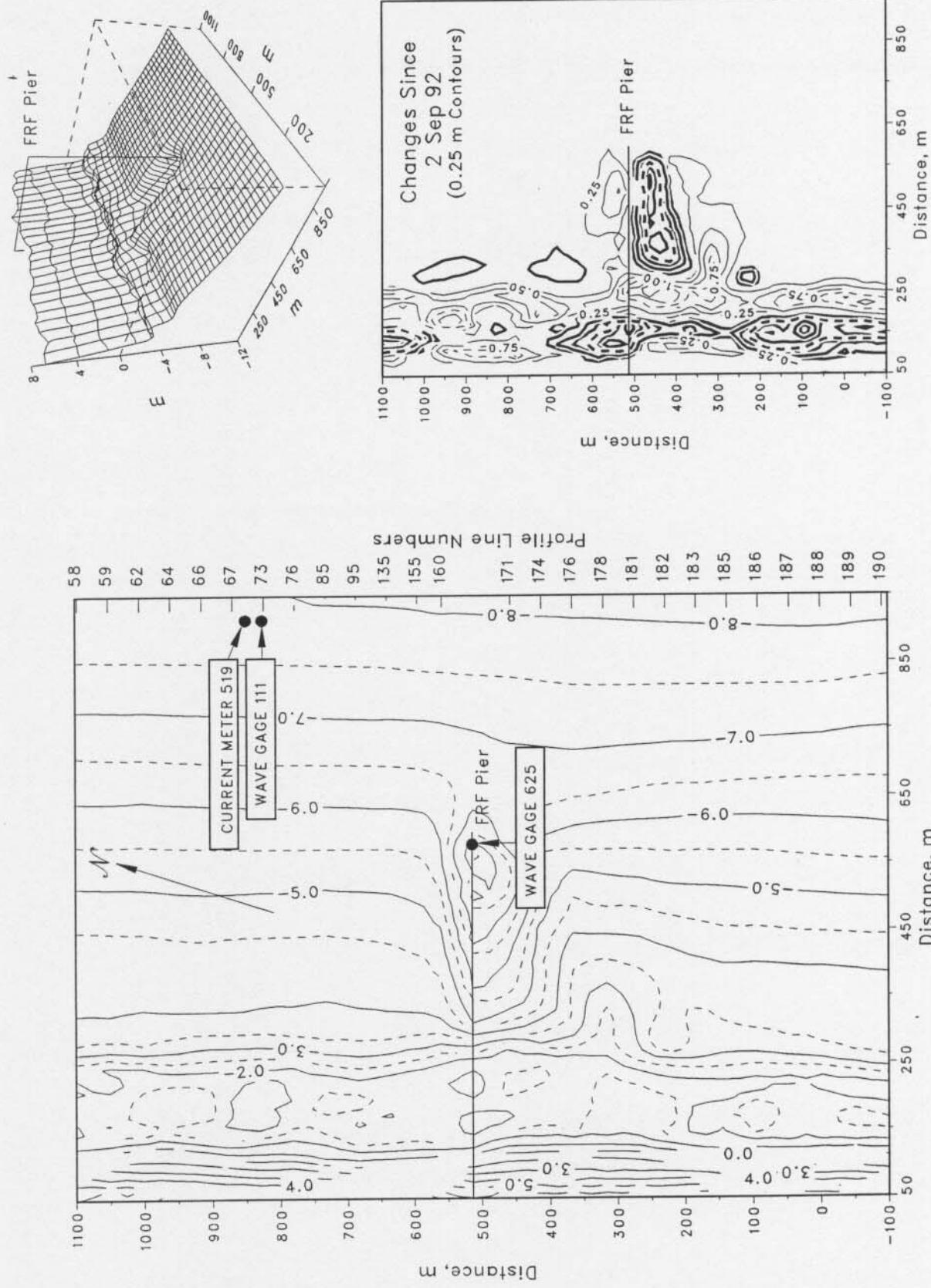


Figure 7. FRF bathymetry 26 Oct 92 depths relative to NGVD

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